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5 separate items enclosed

DARPA 205

MEMORANDUM FOR PRS (In-House / Contractor Publication)

FROM: PROI (STINFO)

18 June 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-AB-2002-146**
Karl Christe (ERC) et al., "Synthesis and Structural Characterization of Nitrogen Containing High
Energy Density Materials" (abstract only)

Int'l Congress, Int'l Union of Crystallography
(Geneva, 6-15 August 2002) (Deadline = 14 July 2002)

(Statement A)

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions, d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.

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APPROVED/APPROVED AS AMENDED/DISAPPROVED

PHILIP A. KESSEL
Technical Advisor
Space and Missile Propulsion Division

Date

Synthesis and Structural Characterization of Nitrogen Containing High Energy Density Materials

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Polynitrogen compounds are of great interest as High Energy Density Materials (HEDM). Single crystal x-ray crystallography plays a crucial role in the characterization of these materials and their precursors. In this paper, we report the crystal structures of the novel N_5^+ cation in $N_5^+ Sb_2F_{11}^-$, which is the first stable polynitrogen species to be discovered in a century since the discovery of the azide ion. The other HEDM materials synthesized and characterized are $N_2F^+ M_xF_{2x+1}^-$ ($M = As$ or Sb), $NOF_2^+ AsF_6^-$, $NF_4^+ Sb_2F_{11}^-$, $NH_3F^+ SO_3CF_3^-$, $M(N_3)_3$ ($M = As$ or Sb) and $SbCl_x(N_3)_{6-x}$ ($x = 2$ or 4). In the case of oxofluorides, oxygen fluorine disorder is frequently encountered and a new method for obtaining valuable structural information from disordered structures is briefly discussed for the NOF_2^+ cation. The techniques employed for handling these energetic materials for x-ray diffraction studies will also be described.

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